SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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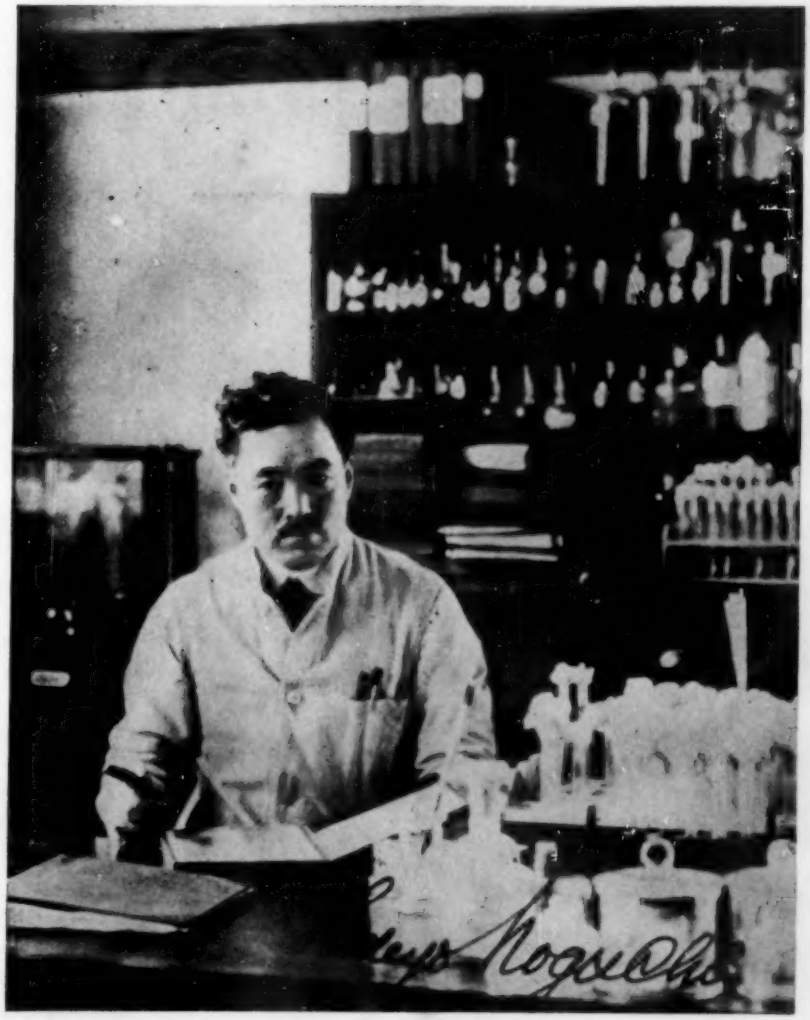

MARTYR FOR SCIENCE

Dr. Hideyo Noguchi: Yellow Fever Victim

(See page 338)

Vol. XIII No. 373

Noguchi's Lead Still Followed

Pathology

Not for months and perhaps years will the medical world be able to estimate the importance and value of the varied researches undertaken by Dr. Hideyo Noguchi, internationally known bacteriologist, and latest addition to yellow fever's long list of scientific martyrs.

From the germ cultures he has left, perhaps from samples of his own blood that he insisted be taken from his body for inoculation of monkeys, it may be found whether or not there are two forms of the disease, one American and one African. It may be that when his assistants who are at work on his material have their results ready to give the world, the ancient controversy will be settled and it will be established whether the dread "yellow jack" was one of the New World's questionable gifts to humanity or whether it was brought over from Africa with the importation of slaves.

During work on yellow fever in South America in 1918 Dr. Noguchi isolated a germ believed to be the cause of yellow fever. From it he developed a preventive vaccine and a causative serum that proved fairly efficacious if used within two or three days after the onset of the disease. Campaigns against the deadly stegomyia mosquito, carrier of the disease, practically stamped out the infection in the Western Hemisphere. Nevertheless, it continued to be a serious menace in West Africa.

Epidemiologists stress the importance of suppressing yellow fever in the west of Africa before a transcontinental railway is opened up to carry the disease to the East. The stegomyia flourishes in the warmer countries of the Orient, and once these mosquitoes became infected the havoc that a disease like yellow fever would wreak amid the unsanitary conditions of India and southern China would be appalling and should be prevented at any cost.

Anxious to smother the disease before it could spread afresh from its last stronghold, the International Health Division of the Rockefeller Foundation established a laboratory at Lagos, Nigeria, where a trained staff have been at work on the problem for many years. In South America, Dr. Noguchi was able to transfer the disease to monkeys and even guinea pigs, but workers in Africa found it impossible to inoculate any animals for a long time, a condition that argues in favor of two distinct entities for the disease in the two countries. In all outward aspects, however, they are much alike. Finally Dr. Adrian Stokes, a British investigator at the Laboratory at Lagos, succeeded, along with a group of colleagues, in infecting monkeys of the variety known as *Macacus rhesus* with typical African yellow fever. Dr. Stokes also succumbed to the disease. But his work constituted an important step, since it did away with the necessity in studying the African form for volunteer human victims, such as were called for by the U. S. Army Commission in Havana years ago. At the same time the workers were unable to find the causative Leptospira in the patients' blood. It almost seemed as if the two diseases had different origins.

Since Dr. Noguchi was generally conceded to know more about this particular group of germs than any other living person, he undertook the African trip last fall to see if he could personally sort out the two diseases. Perhaps his skillful crippled hands, famous throughout the realm of bacteriology for their technique with test tube and microscope, could demonstrate *Leptospira icteroides* where others had failed, or even show an entirely different cause. While at work he contracted the disease and died. Whether or not he found what he sought, authorities at the Rockefeller Foundation refuse to affirm or deny. Only after his coworkers and assistants have some concrete results to show from his research will the world know. In the meantime, the work at Lagos goes on.

Science News-Letter, June 2, 1928

In This Issue—

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Plants Aid Man in War on Mosquitoes

Entomology

IF THEY WERE AS BIG as they feel: an ordinary mosquito, much magnified

By Frank Thone

Mosquito time will be upon us soon. The resounding slap will echo through the night, and the atmosphere will be blue with the smoke of smudge-fires—and mayhap also with the language of the tormented. Public health workers, disdaining such minor things as itching lumps on the skin, will be spreading oil or arsenic dust on ponds and swamps, and encouraging that helpful little larva-devouring minnow Gambusia to increase and multiply and possess the waters.

In this extensive and sometimes expensive warfare it is comforting to reflect that man has a number of allies, not only among the mosquito-devouring fishes and other animals, but among the humble and usually disregarded plants that live beneath the surface of the shallow waters where mosquitoes love to breed. In several far-away corners of the world live species of water-weeds that are foes of mosquitoes, and some of these are now being brought to the United States, to see whether they will be equally hostile to our own particular species of singing, stinging winged tormentors.

Perhaps the most promising of these mosquito-banning plants is an Australian species known to scientists as *Nitella phaulotes*. It hasn't any common English name, because so far nobody but scientists have had even an inkling of its importance, and hence it has gone virtually unnoticed. It isn't a very noticeable plant anyway, because it grows wholly under water, usually in such dense masses that the casual observer merely gets the impression of a waving, blurry bed of dark green, and lets it go at that.

If you plunge your arm into the water and haul up a few stems of Nitella, you will find them not unattractive objects. They get to be as much as a foot long, and consist of a slender, straw-like central axis or stalk, with whorls of short, pointed branches projecting star-fashion from each of its many joints. It has no leaves; these short branches serve the purpose instead. Other branches also may arise at these joints, and grow out into secondary stems which in their turn bear little stars of short branches like the parent stem.

Nitella, and the other plants of the group to which it belongs, are classed by botanists as among the humblest of the vegetable kingdom. They are known as algæ, and are relatives of the sea-weeds and the slimy scum that forms on stagnant ponds. Niteila and its relatives, however, are commonly rated as the highest algæ; they are the aristocrats of this lowly world.

There are many species of Nitella, and they are spread all over the world, but the one most effective against mosquitoes has so far been studied only in Australia. E. W. I. Buhot, a scientist of Brisbane, found the plant growing under running water on the bottom of a creek, and when he noticed it later in stagnant water it was never seen floating at the surface. A green scum and a thin film resembling oil occurs on the water inhabited by this plant. The green scum was proved to be due to a bacterial growth, and the thin film to any oily secretion of the Nitella.

Mr. Buhot found that mosquitoes would not lay their eggs on the surface of the water where this plant grew, but the water was not harmful to either fish, mammals or human beings. The plant grows rapidly, reproduces freely, and is easily transplanted. It can be used on ornamental ponds. Mr. Buhot thinks that it will come into general use in the large lagoons and swamps of the Brisbane area, which breed swarms of mosquitoes to the great discomfort of the city's inhabitants.

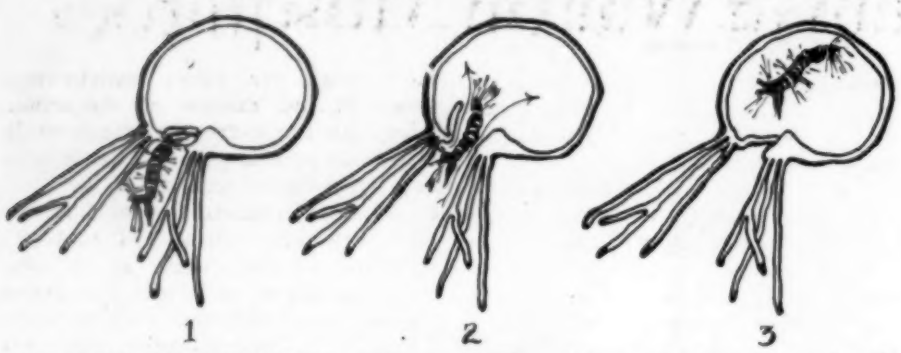
Dr. L. O. Howard, who recently retired after many years as chief of the Bureau of Entomology, U. S. Department of Agriculture, has been greatly interested in mosquito problems generally, and has made especial efforts to get mosquito-killing plants introduced into this country. As a result of his interest, Prof. Robert Matheson of Cornell University has undertaken to experiment with Mr. Buhot's species, to learn whether it is adaptable to cultivation under American conditions. The region around Ithaca, N. Y., where Cornell University is situated, is especially suited for such an experiment, for Nitella and its relatives are lime-loving plants and the waters of that part of New York state are well charged with lime. Should the plant thrive here, and prove as effective against American mosquitoes as it is against their relatives in the antipodes, a very useful plant ally will have been recruited for the American anti-mosquito campaign.

There are other species of Nitella, and of a related plant genus known as Chara, that seems to possess this mosquito-stopping power at least to a certain extent. T. P. Blow, a mosquito specialist working in Madagascar, found no less than three of these plants, one species of Nitella quite distinct from the Australian plant and two species of Chara, that seem to keep the water in their neighborhood clear of mosquito larvæ, or "wigglers" as we commonly call them. Professor Matheson has already tried out a third species of Chara in his experiments at Cornell, and obtained some rather promising results.

Of course, even if some or all of these mosquito-banning plants prove to be well adapted to use in America, that will not mean that the troubles of American mosquito fighters, both lay and profes- (*Turn to next page*)

BRANCH OF NITELLA, the humble aquatic plant whose oily secretion prevents mosquitoes from breeding on ponds where it grows

Plants Aid in Mosquito Fight—*Continued*



THE VANISHING WIGGLER: A Drama in Three Acts. 1: the larva approaches the Bladderwort's trap and feeds on the secreted "bait." 2: The trap is sprung, and the inrush of water carries the luckless larva inside. 3: "All hope abandon": captured and powerless to escape, the larva awaits death and digestion

sional, are at an end. So far as we know at present, Nitella and Chara will grow freely and develop their anti-mosquito properties fully only in limestone regions, so that the granite hills of New England and the sand-bottomed ponds and alluvial swamps of the South will have to look elsewhere for relief. But there is a vast deal of limestone country in America, so that the usefulness of these possible plant allies is not to be minimized.

These plants drive off mosquitoes by means of some substance poisonous or repellant to them; but there is another plant species, much higher in the botanical social scale, that actually traps and eats their luckless larvæ. This is the bladderwort, a floating aquatic plant that sends its bright, odd-shaped but attractive yellow flowers above the surface on short stalks. Nothing but these stalks and the flowers they bear emerges from the water; all the rest —the stems and the finely divided leaves—remains always beneath the surface.

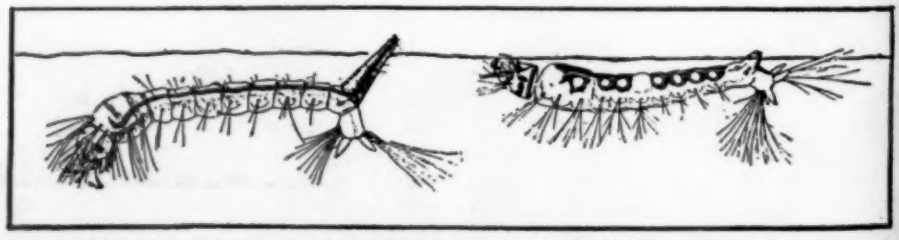
On these underwater stems each plant bears a number of the oddest structures one can find in the vegetable kingdom. They are hollow little bladders, partially or entirely filled with water. At one side there is a small round opening filled with a little trap-door or valve that opens inward.

This makes it easy for small creatures to enter, but impossible for them to leave, as perfect a trap as you could imagine. Larvæ of insects and other small water animals have often been found in these bladders, among them mosquito wigglers, and it has been assumed that they blundered into these natural traps more or less by accident, there to die and yield nourishment to the plant. But Dr. Howard now reports new information which he has received from F. Brocher, a careful French observer, which indicates that the plant actually snaps up its prey almost as with a shark-like mouth. The mosquito larvæ and other small aquatic animals are attracted to the bladders by a secretion of certain glands close to its opening. They gather round to feed on this bait, the valve then opens, and a slight current in the water caused by its opening sweeps them in through the waiting mouth—and they never come out any more. These observations have been confirmed by those of an English naturalist, C. L. Withycombe, so there seems to be no doubt of their reality. Just how many mosquito larvæ are destroyed in this way there is no present means of telling, but if the bladderwort accounts for only a few, it is to that extent a benefactor of the human race. Every wiggler that is engulfed by its underwater traps means one mosquito that will not live to lance a sensitive earlobe or bite a delicate ankle. And the total must be at least fairly respectable, for the bladderwort is one of the most widely distributed plants in the world. Almost every wayside pond can show a crop of them.

Way down on the Suwannee River, and on innumerable other streams and lakes of the South, there grows a plant immigrant from Africa that has come to be one of the greatest plant tests in Dixie. This is the water hyacinth. Originally cultivated for its spikes of bright blue or purple flowers, it has escaped and run wild and now threatens to close many Southern waters to navigation with its immense mats of spreading vegetation. But pest though it is, it appears to have one redeeming trait, for it has been observed that wherever it grows mosquitoes diminish in numbers. The plant itself seems to have no poisonous or repellant properties so far as the insects are concerned; its influence is indirect, through the harboring of other enemies of mosquitoes.

At first it was thought that these were numerous small predatory insects or crustaceans, but later evidence points to a fish, our old friend Gambusia, who has recently been given the highly honorable title of "mosquito fish." This voracious little minnow, whose favorite food is mosquito wigglers, finds among the dangling roots of the water hyacinth a safe refuge from bigger fish that would very willingly make a meal of him if they caught him in open water. So he and his wife and his friends congregate there, and since there are so many of them, and every one is always hungry anyway, every inch of water-surface is naturally searched and very few wigglers survive to become adult mosquitoes.

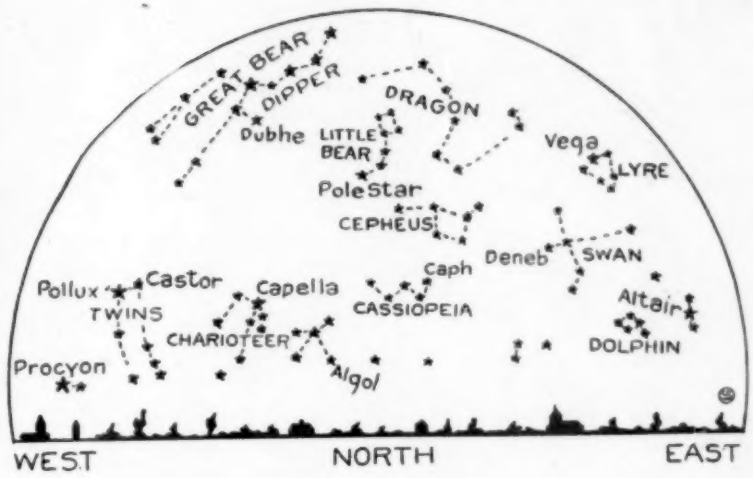
The most recent additions to the list of man's vegetable friends are certain plants of the clover family, which do not kill the mosquito but, it is claimed, kill the malaria parasites inside her. This suggestion came originally from Dr. F. d'Herelle, of bacteriophage fame, and is now supported by Sir William Willcocks, who has had long experience as an administrator in Egypt. Dr. d'Herelle called attention to the fact that in certain regions in the Argentine, which are free from malaria, there is an abundant wild plant, a scented clover, which (*Turn to Page* 349)



IF THE MOSQUITO "WIGGLER" sticks only his tail above water he is merely annoying . . . If both head and tail are out, he's a wicked malaria-carrier

June Brings Evening Planets

Astronomy



By James Stokley

There is one event that June always brings that is welcome to most people. This is the beginning of summer, with which come the year's longest day. But June, 1928, also has some other features. Early in the month the planet Mercury, which comparatively few people have ever observed, was seen in the evening sky; Saturn, the ringed planet, is an all-night visitor for practically the entire month. Then there is also an eclipse of the sun.

The eclipse is a poor one. In the first place, it is not total, but merely partial; at no place on the earth's surface does the opaque moon completely cover the lunar disc. It is not even almost total, but from the vicinity of the Shetland Islands, south of Cape Horn, early in the afternoon of June 17, one edge of the sun will be covered for a few minutes. The sun, then, will look like a round cracker from which a timid bite has been taken. Such an eclipse is completely without scientific importance, and no astronomers will travel to see it.

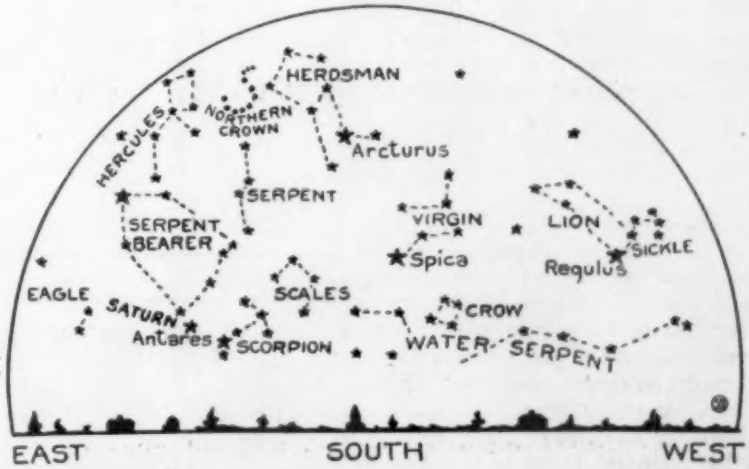
However, with such important objects as the sun and the moon, the astronomers have to keep continual track of their wanderings, and so even if the eclipse does not amount to anything, they have to figure it out, just as if it were a total eclipse of long duration. One interesting thing about this eclipse is that it is the second in a month.

On May 19, the sun was just barely covered by the moon, and there was a very short total eclipse, also only visible in the extreme south. Since then the moon has made a complete circuit around the earth, and on the 17th of June, once again comes partly in front of the sun. On its way around the earth, the moon also gets in the earth's shadow, thus producing a lunar eclipse, on June 3. This is total, which means that the moon is completely engulfed in the earth's shadow. But it happens that the eclipse occurs at about 7:00 a. m., when, for most American observers, the moon has set in the west, and so we shall see nothing of it.

This combination of three eclipses, one of the moon, and two of the sun, within a single month, is not common, though it has happened as recently as 1924, and will occur again in 1931. Unfortunately for astronomers who are anxious for the fleeting moments of a total eclipse to make observations impossible at other times, the solar eclipses at such times are never satisfactory ones. If the shadow of the moon fully hits the earth, by the time it comes around again the earth will be missed completely.

There is something else that the sun does this month, and that astronomers have taken as a convenient milepost with which to begin the season of summer. That happens at 11.07 a. m., Eastern Standard Time, on Thursday, June 21. Then the sun reaches its farthest north position of the year. At noon that day, at a point on the tropic of cancer, the sun is directly overhead. At such places a curious effect is observed in that vertical posts or poles cast no shadows, an effect that some of the ancient Aztecs in Mexico used to time one of their important religious festivals. They referred to it as "the sun god descending to earth."

We of countries farther north than the tropic of cancer never observe the sun god to thus "come to earth." We do, however, at that time, the summer solstice, as the event is called, have the longest period of sunshine of the year. "What is so rare as a day in June," sang the poet, but on the 21st we will have over fifty per cent. more daylight than we will have on December 22, when the year's shortest day will arrive. On the longest day the sun, at latitude 40 degrees north, will rise at 4:31 a. m., and will set at 7.32 p. m., local time. (For daylight saving time, it would rise at 5:31 and set at 8:32.) There are thus more than 15 hours of daylight on the day of the summer solstice. (*Turn to next page*)



HOLD THESE MAPS IN FRONT OF YOU on a June evening. The upper will then show the stars you see when you face north, and the lower those visible when you face south

June Evening Skies—*Continued*

These figures refer to the actual setting of the sun itself. Of course, twilight continues for several hours after sunset, and begins several hours before sunrise. This is an effect of the earth's atmosphere. While the sun is below the horizon for a person on the surface of the earth, the air above him may still be illuminated. If we lived on an airless planet, Mercury, for example, this would not happen. Darkness would come immediately at sunset, and the day would come exactly at sunrise. As it is, with evening twilight lasting at the time of the solstice until 9:35 p. m., as the astronomer reckons it, and morning twilight beginning at 2:27 a. m., there are only about 4 hours and 52 minute of real darkness on the night of the 21st of the month.

Farther north, as in the British Isles, darkness does not come at all at this time of year, but morning twilight begins before the evening twilight has ended. And then if one goes still farther north, to North Cape, for instance, the sun does not set at all, and one sees the strange phenomenon of the midnight sun. On the other hand, at 40 degrees south latitude, the parallel of which passes through New Zealand, they are now enjoying their winter months. There, at our summer solstice, they have the winter solstice, and the times of sunrise and sunset are just about the same as they will be for us on the 22nd of next December, as given above.

Mercury, the nearest of all planets to the sun, is visible at the beginning of June, but it is never conspicuous, and seldom visible at all in the evening sky. The result is that even some great astronomers have rarely if ever seen it, while most laymen have never observed it. This is because Mercury is so close to the sun, around which it revolves once in 88 days at a distance of 36 million miles. Mercury always closely accompanies the sun, the two rising and setting at nearly the same time. But on certain occasions it reaches its distance farthest to the east of the sun, and then may set as much as an hour or two later. This is called greatest eastern elongation, and happens on the 2nd of June. At this time, and for a few days afterwards, Mercury should be seen as a bright star, low in the west just after sunset. But Mercury quickly, as becomes the messenger of the gods, passes on, and by the 29th of June he is between the sun and the earth, and well on his way to becoming a morning star, visible in the morning twilight.

The other planetary decoration of the June evening sky is Saturn. It is in the constellation of the Scorpion. Saturn is seen during the evening in the southeast, close by and to the left of the red star Antares, the eye of the Scorpion. Saturn itself shines even more brightly, but is of a yellowish color. With a small telescope, magnifying perhaps 50 diameters or more, the circular appendages, or "rings" of Saturn are revealed.

As it has been for the last few months, the June evening sky is occupied by an unusally large number of bright stars. Almost directly overhead is Arcturus, in the constellation of Bootes, the Charioteer. Arcturus is one of the brightest stars in the heavens, for of all the stars that we can see, it is only exceeded in brilliance by Sirius, Vega and Capella. Sirius was visible in the winter sky. It has now departed, but Vega can be seen high in the eastern sky, in the constellation of Lyra, the Lyre. Capella is low in the northwest in Arcturus, hardly visible because it is so near the horizon, though during the past few months it was better placed.

Below and to the right of Vega is Altair, in the constellation of Aquila, the eagle. Pollux, one of the two twins, Gemini, is low in the northwest not far from Capella. Spica, in Virgo, the Virgin, is in the southwest, while to the west, at the end of the handle of the "Sickle" in Leo, the lion, is Regulus. The ruddy Antares, in Scorpius, is in the southern sky, near Saturn, as was mentioned before. The "Northern Cross" in Cygnus, the Swan, is in the eastern sky, with the cross lying on its side, and with the bright Deneb at the northern end.

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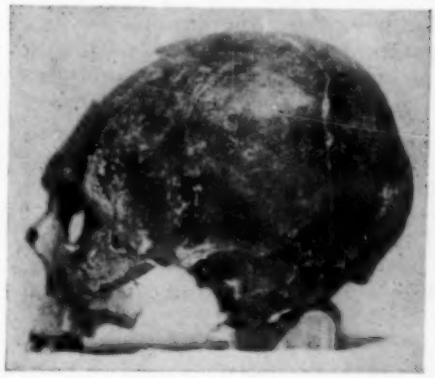
The human body contains copper, zinc, tin, manganese, iron and aluminum, but none of these metals except iron has any known usefulness to the body.

25,000 Year Old Skulls

Archæology

While Cro-Magnon man ruled Europe, 25,000 years ago, he had as neighbors in Africa a race who used tools and weapons like his own, but who in their bodily make-up so closely resembled men of today that they may fairly be called "modern." This great backward extension of the history of the "modern" type of human beings is the most significant point about the recent discovery by American and French anthropologists of a number of ancient skeletons in a shell mound at Mechta, Algeria. This opinion was expressed by Prof. Fay-Cooper Cole of the University of Chicago.



THE MECHTA SKULL; its one-time owner was a contemporary of Cro-Magnon man some 25,000 years ago, but he was a "modern" in his physical make-up

For the past three years Beloit College has been conducting excavations in France and North Africa, under a fund given by Dr. Frank Logan, Chicago philanthropist. Dr. George Collie, director of the museum at Beloit, has spent much time in the field, while active excavation has been carried on by graduate students in anthropology from the University of Chicago.

Last year Alonzo Pond, one of the American workers, found the skeleton of a child in a shell-heap of Cro-Magnon age at Mechta. This year another worker, Paul Nesbitt, took out three more skeletons, while previously a Frenchman named Debrugge had secured a skeleton there.

A careful study of the shell mound and its contents indicate that it seems to be like the Old Stone Age finds of Europe of 25,000 years ago. No New Stone Age objects occur in the site, and no bones of any domestic animals were found—domestication of animals is a "modern" accomplishment. "We seem to be justified in saying that the site is pre-Neolithic, and is probably as old as the Aurignacian," Prof. Cole concludes.

The skeletons are neither Neanderthal nor Cro-Magnon. One skull, a woman's, shows negroid characteristics, but the others appear to be rather close to the Mediterranean type, though somewhat more primitive.

Fuller details will be announced when the material shall have arrived in America.

Science News-Letter, June 2, 1928

Neutral on Metric System

General Science

The Bureau of Standards' stand regarding the compulsory adoption of the metric system was for the first time publicly announced when Dr. George K. Burgess, director of the national bureau, made this subject a part of his address to the twenty-first National Conference on Weights and Measures. While nothing has been said before, it has been hinted that this government organization was an ardent advocate of the system.

Dr. Burgess stated: "As to the attitude of the Bureau in relation to the compulsory adoption of the metric system, we may state that the facts in the case are that in relation to all proposals advocating the compulsory adoption of the metric system of weights and measures in the United States the policy of the Bureau is one of neutrality—neither to advocate nor to discourage. I can say definitely and emphatically that the Bureau is not advocating the adoption of the metric system for commercial or industrial uses whether by legislation or otherwise, nor has it ever done so during the period that I have been Director."

This statement was made to the weights and measures officials of the country assembled here for a four-day meeting to discuss practical questions affecting their official duties.

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The great standard article of food on the menu of the California Indians was acorn mush.

Sphynxes Discovered

Archæology

Digging 60 feet beneath a tourist headquarters at Sakkhara, the expedition of the Metropolitan Museum of Art has unearthed a number of stone sphynxes and statues. The building stood close to the ruins of the temple of Queen Hatshepsut, and was recently vacated so that archæologists might explore the site.

The stone sculpture, roughly broken, dates back to the sixteenth century B. C., when Queen Hatshepsut was overthrown by Thutmose III. By the new king's orders, all statues of the fallen queen were ordered mutilated and smashed, and the beautifully carved, smiling faces of the Queen were thoroughly battered by workmen wherever they found representations of her.

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Meteor Air Waves Simulate Quake

Astronomy

Apparent "earthquakes" accompanying a great meteor, such as that which flashed over Georgia and South Carolina recently, are really due to air waves from the speeeding celestial projectile. This is the opinion of Prof. Charles P. Olivier, of the University of Virginia, and recognized authority on meteoric astronomy.

It is not possible for such a meteor to cause an actual tremor of the earth, he stated. However, as it passes through the earth's atmosphere, it causes air waves, similar to those caused by a projectile from a large gun. The meteor may travel as fast as 25 miles a second, or around fifty times the speed of the shell from the gun, and so the air waves are much stronger. As they strike houses and buildings, they cause them to vibrate, even breaking window panes and cracking plaster walls. To a person within such a building, the effects are practically indistinguishable from those of an earthquake.

Professor Olivier, who is president of the American Meteor Society, an organization of volunteer observers of meteors, has not received any reports of the Georgia meteor. In fact, he said, as the society has no members any nearer than Florida, none are likely to have seen this one. Reports that the meteor was "as large as a house" are probably exaggerated, and due to irradiation, an effect in the eye that makes brilliant objects appear larger than the same things when they are dark. A meteor weighing only a hundred pounds and traveling with high velocity, would produce all the effects described, he said.

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The Rise and Future of Engineering

Engineering

HERBERT HOOVER, in a speech upon receiving the American Institute of Mining and Metallurgical Engineers Medal:

Three great forces contributed to the development of the engineering profession. The first was the era of intense development of minerals, metallurgy and transportation in our great East. It greatly stimulated invention; it made a demand for training and skill on the part of our engineers. The pressure of material development advanced our American practice beyond the rest of the world. Moreover, the skill of our engineers of that period owes a great debt to American educators. The leaders of our universities were the first of all the educators of the world to recognize that upon them rested the responsibility to provide fundamental training in the application of science to engineering under the broadening influence and cultivation of university life. They were the first to realize that engineering must be transferred into a profession in the highest sense, not only in the training and character but that the essential quality of a profession is the installation of ethics. That implies not alone the job, but the responsibility of the community for the job. Our universities poured into our development a great stream of men with this background and training. A third distinction that grew in American engineering was the transformation from solely a technical profession to a profession of administrators—the business manager with technical training.

Our American engineering practice in many branches, particularly in mines, transportation and electricity became the envy and ideal of the world. American engineers were solicited to install American methods and American machinery abroad. The first of these demands came from South Africa of such men as Hamilton Smith, of Hennen and Sydney Jennings, of John Hays Hammond. Quickly their brilliant success created a demand for more and more of their kind, followed by hundreds of others. Your expressions are at least idealization of that whole caravan of American missionaries. Perhaps few of us realize the effect of their service both at home and abroad. A vast sum of industrial advance over the whole world came from their hands. A vast amount of added experience was brought back to our country. A vast support was given to our manufacturers and workers in the export of American equipment. There grew up a vast appreciation of America as a land of intellectual as well as material accomplishment.

The reputed salaries and high commands of these great men in our professions fired the imaginations of the college youngsters of my day. But when we left college and offered our intellectual wares, however, to the hard-footed mine managers we had great disillusionment. We went further into the depths when we moderated our offerings step by step from a willingness to favor them in the position of assistant manager, down finally to a job pushing a car and pounding a drill in the wettest level. In any event, on the night shift we youngsters had a certain amount of time to think how much easier it was to be a consulting engineer or manager of great enterprises at a high salary than to push a car at $2 a day. I was sure at that time that the manager of the mine where I worked had so little a quality of insight into my true value that at least he would never merit being called into anything higher. I was even disposed at that time to think he was destined for something even lower. But, in fact, in after years I was grateful for this apprenticeship and, indeed, it is this rigorous insistence on the part of our elder engineers which has contributed much to our American training. In time came the opportunity from the great leaders of American engineering at home and over the world for crews of university-trained youngsters. One of these jobs came near our town. There was no fantastic salary attached to it, but we had difficulty in refraining from offering to take it for less for fear it might escape.

This first real important job is the momentous thing in an engineer's life. Each of us in turn has believed that all hope for the future and the present fate of whole nations depended upon its proper accomplishment. And these first jobs are never arm-chair labors. They do not take place in the comfort of cities. Living on the edges of civilization is a much more drab affair than the current novels on frontier life would lead one to surmise. Yet there endures to the layman something of remorse and adventure in the engineering profession. Kipling, Richard Harding Davis and others have given high color to the romance of our profession. My own experience with the romance of it has made me wary at times of the romance parts. When I hear of it I have a desire also to know how long ago it took place. I have learned that the romance factor increases with time. My experience in the adventure parts of the engineering profession is even more dubious—anything of this sort from bad men to armies, wars, shipwrecks or floods which come across the engineer's orbit, are disturbers of progress. They all require repairs afterwards and no engineer gets satisfaction from repair jobs. But, after all, it is an occupation of enormous diversity of interest, a change of scene, of vivid and human relations. There is but little of repetition. It is a constant call for all that lies in men.

The exchange of engineering experience and scientific discovery between nations is one form of internationalism that is beyond any reservations. America has made notable contributions to this advancement. . . . The job of the engineer is the application of science to the increased comfort of safety of man. It is his work to take from the laboratory of the scientist the raw material of thought and discovery and to materialize it into daily use. He, therefore, has a responsibility not alone to keep his application of science abreast of science by discovery but, on the other hand, he must assure research; for without new discovery the progress of engineering must cease. . . .

As our population grows in numbers, as our problems become more complex, so does also grow the need for wider and wider vision of the engineering profession. Our problems of transportation, of housing, of power, of communication, of economical use of our natural resources, of safety and protection to our people now require long planning in advance. We no longer have a right to think in terms of our own generation. A greater America for our children will, in a large degree, depend upon the engineering profession.

CLASSICS OF SCIENCE:

Theory of Strata

Geology

The arrangement of strata in your neighborhood and the kinds of rock which compose them will afford an illustration of Hutton's theory of their formation.

ILLUSTRATIONS OF THE HUTTONIAN THEORY, 1802, in The works of John Playfair, Esq., Vol. 1. Edinburgh, 1822.

Strata Have Moved

Now, it is certain, that many of the strata have been moved angularly, because that, in their original position, they must have been all nearly horizontal. Loose materials, such as sand and gravel subsiding at the bottom of the sea, and having their interstices filled with water, possess a kind of fluidity: they are disposed to yield on the side opposite to that where the pressure is greatest, and are therefore, in some degree, subject to the laws of hydrostatics. On this account they will arrange themselves in horizontal layers; and the vibrations of the incumbent fluid, by impressing a slight motion backward, and forward, on the materials of these layers, will very much assist the accuracy of their level.

It is not, however, meant to deny, that the form of the bottom might influence, in a certain degree, the stratification of the substances deposited on it. The figure of the lower beds deposited on an uneven surface, would necessarily be affected by two causes; the inclination of that surface, on the one hand, and the tendency to horizontality, on the other; but, as the former cause would grow less powerful as the distance from the bottom increased, the latter cause would finally prevail, so that the upper beds would approach to horizontality, and the lower would neither be exactly parallel to them, nor to one another. Whenever, therefore, we meet with rocks, disposed in layers quite parallel to one another, we may rest assured, that the inequalities of the bottom have had no effect, and that no cause has interrupted the statical tendency above explained.

Layers Originally Horizontal

Now, rocks having their layers exactly parallel, are very common, and prove their original horizontality to have been more precise than we could venture to conclude from analogy alone. In beds of sandstone, for instance, nothing is more frequent than to see the thin layers of sand, separated from one another by layers still finer of coaly, or micaceous matter, that are almost exactly parallel, and continue so to a great extent without any sensible deviation. These planes can have acquired their parallelism only in consequence of the property of water just stated, by which it renders the surfaces of the layers, which it deposits, parallel to its own surface, and therefore parallel to one another. Though such strata, therefore, may not now be horizontal, they must have been so originally; otherwise it is impossible to discover any cause for their parallelism, or any rule by which it can have been produced.

JOHN PLAYFAIR

This argument for the original horizontality of the strata, is applicable to those that are now farthest removed from that position. Among such, for instance, as are highly inclined, or even quite vertical, and among those that are bent and incurvated in the most fantastical manner, as happens more especially in the primary schisti, we observe, through all their sinuosities and inflections, an equality of thickness and of distance among their component laminæ. This equality could only be produced by those laminæ having been originally spread out on a flat and level surface, from which situation, therefore, they must afterwards have been lifted up by the action of some powerful cause, and must have suffered this disturbance while they were yet in a certain degree flexible and ductile. Though the primary direction of the force which thus elevated them must have been from below upwards, yet it has been so combined with the gravity and resistance of the mass to which it was applied, as to create a lateral and oblique thrust, and to produce those contortions of the strata, which, when on the great scale, are among the most striking and instructive phenomena of geology. . . . It is plain, that if they remained now in the situation in which they were at first deposited, they would never appear to be suddenly broken off. No stratum would terminate abruptly; but, however, its nature and properties might change, it would constitute an entire and continued rock, at least where the effects of waste and *detritus* had not produced a separation. This, however, is very far from being the actual condition of stratified bodies. Those that are much inclined, or that make considerable angles with the horizontal plane, must terminate abruptly where they come up to the surface. Their doing so is a necessary consequence of their position, and furnishes no argument, it may be said, for their having been disturbed, different from that which has been already deduced from their inclination. There are, however, instances of a breach of continuity in the strata, under the surface, that afford a proof of the violence with which they have been displaced, different from any hitherto mentioned. Of this nature are the *slips* or *shifts*, that so often perplex the miner in his subterraneous journey, and which change at once all those lines and bearings that had hitherto directed his course. . . . These *shifts* are often of great extent, and must be measured by the quantity of the rock moved, taken in conjunction with the distance to which it has been carried. In some instances, a vein is formed at the plane of the shift or slip, filled with materials of the kinds which will be hereafter mentioned; in other instances, the opposite sides of the rock remain contiguous, or have the interval between them filled with soft and unconsolidated earth. All these are the undeniable effects of some great convulsion, which has shaken the very foundations of the earth; but which, far from being a disorder in nature, is part of a regular system, essential to the constitution and economy of the globe. . . .

Great Unconformities

Though such marks of violence as have been now enumerated are common in some degree to all the strata, they abound (*Turn to next page*)

Theory of Strata—*Continued*

most among the primary, and point out these as the part of our globe which has been exposed to the greatest vicissitudes. At their junction with the secondary, or where they emerge, as it were, from under the latter, phenomena occur, which mark some of those vicissitudes with astonishing precision; phenomena of which the nature was first accurately explored, and the consequences fully deduced, by the geologist whose system I am endeavouring to explain. He observed, in several instances, that where the primary schistus rises in beds almost vertical, it is covered by horizontal layers of secondary sandstone, which last are penetrated by the irregular tops of the schistus, and also involve fragments of that rock, some angular, others round and smooth, as if worn by attrition. From this he concluded, that the primary strata, after being formed at the bottom of the sea, in planes nearly horizontal, were raised, so as to become almost vertical, while they were yet covered by the ocean, and before the secondary strata had begun to be deposited on them. He also argued, that, as the fragments of the primary rock, included in the secondary, are many of them rounded and worn, the deposition of the latter must have been separated from the elevation of the former by such an interval of time, as gave room for the action of waste and decay, allowing those fragments first to be detached, and afterwards wrought into a round figure.

Indeed, the interposition of a breccia between the primary and secondary strata, in which the fragments, whether round or angular, are always of the primary rock, is a fact so general, and the quantity of this breecia is often so great, that it leads to a conclusion more paradoxical than any of the preceding, but from which, nevertheless, it seems very difficult to withhold assent. Round gravel, when in great abundance, agreeably to a remark already made, must necessarily be considered as a production peculiar to the beds of rivers, or the shores of continents, and as hardly ever formed at great depths under the surface of the sea. It should seem, then, that the primary schistus, after attaining its erect position, had been raised up to the surface, where this gravel was formed; and from thence had been let down again to the depths of the ocean, where the secondary strata were deposited on it. Such alternate elevations and depressions of the bottom of the sea, however extraordinary they may seem, will appear to make a part of the system of the mineral kingdom, from other phenomena hereafter to be described.

On the whole, therefore, by comparing the actual position of the strata, their erectness, their curvature, the interruptions of their continuity, and the transverse stratification of the secondary in respect of the primary, with the regular and level situation which the same strata must have originally possessed, we have a complete demonstration of their having been disturbed, torn asunder, and moved angularly, by a force that has, in general, been directed from below upwards. In establishing this conclusion, we have reasoned more from the facts which relate to the *angular elevation* of the strata, than from those which relate to their *absolute elevation*, or their translation to a greater distance from the centre of the earth. This has been done, because the appearances, which respect the absolute lifting up of the strata are more ambiguous than those, which respect the change of their angular position. The former might be accounted for, could they be separated from the latter, in two ways, viz. either by the retreat of the sea, or the raising up of the land; but the latter can be explained only in one way, and force us of necessity to acknowledge the existence of an expanding power, which has acted on the strata with incredible energy, and has been directed from the centre toward the circumference. . . .

From all, therefore, that relates to the position of the strata, I think I am justified in affirming, that their disturbance and removal from the place of their original formation, by a force directed from below upwards, is a fact in the natural history of the earth, as perfectly ascertained as any thing which is not the subject of immediate observation. As to the power by which this great effect has been produced, we cannot expect to decide with equal evidence, but must be contented to pass from what is certain to what is probable. We may, then, remark, that of the forces in nature to which our experience does in any degree extend, none seems so capable of the effect we would ascribe to it, as the expansive power of heat; a power to which no limits can be set, and one, which, on grounds quite independent of the elevation of the strata, has been already concluded to act with great energy in the subterraneous regions. We have, indeed, no other alternative, but either to adopt this explanation, or to ascribe the facts in question to some secret and unknown cause, though we are ignorant of its nature, and have no evidence of its existence.

James Hutton was born in Edinburgh, Scotland, June 3, 1726, and died in the same city March 26, 1797. He attended the schools and the university in Edinburgh, and became greatly interested in the scientific method of thought. He studied medicine, as the only profession which satisfied his scientific leanings, and spent several years in Paris and Holland, taking his M. D. at Leyden in 1749, at the age of 23. But the practice of medicine did not appeal to him, and at the age of 28 he took up scientific farming in Berwickshire. By 1768, the farm was running so smoothly that its problems no longer interested its owner, and he returned to Edinburgh. There Hutton enjoyed the friendship of scientific companions, and spent the rest of his life in working out his theories of the cause of rain, published in 1784, and of the formation of the earth. The latter was read before the Royal Society of Edinburgh in 1785, with the title: "Theory of the Earth, or an Investigation of the Laws Observable in the Composition, Dissolution and Restoration of Land upon the Globe." Although it marked a great advance in the very new science of geology, the paper was written in so difficult a style that it was not appreciated at its true value until explained by Hutton's friend Playfair five years after the author's death.

John Playfair was born in Benvie, Forfarshire, Scotland, March 10, 1748, and died in Edinburgh July 20, 1819. His higher education was at the University of St. Andrews, where he studied for the ministry but became interested in science. At the age of 18 he was considered for the position of professor of mathematics at Marischal College, Aberdeen, but was not appointed. At 24 he again applied unsuccessfully for professorship of natural philosophy at St. Andrews. The next year, upon his father's death, he succeeded him as minister at Liff and Benvie, where he remained for nine years, but kept up his interest in scientific study. In 1782 he resigned to become tutor of Ferguson of Raith, and thereafter remained in his preferred work. He became professor of mathematics at Edinburgh University in 1785, and during his residence in that city he became the friend of the geologist Hutton. Playfair published his "Illustrations of the Huttonian Theory of the Earth" in 1802, five years after the death of the older scientist, and by his clear exposition made Hutton one of the shapers of the new science of geology. Playfair, after teaching mathematics for 20 years, became professor of natural philosophy at Edinburgh in 1805, and continued in that position for the rest of his life.

Inter-College Sports Denounced

Psychology

The American college custom of sending out a small squad of highly trained athletes to do or die for *Alma Mater*, while the rest of the students, undertrained physically, yell for victory from the sidelines, was emphatically denounced in a recent address by Dr. Knight Dunlap, professor of psychology at Johns Hopkins University. Dr. Dunlap spoke before the American Physical Education Association.

"An important function of the college and university today is to furnish sport and amusement for the mob, thus linking our great educational institutions up with Hollywood and the municipal zoos," the psychologist said.

Urging investigation of the powerful force that inter-collegiate athletics have become in the past 25 years, Dr. Dunlap said that data should be gathered to compare the ranking of a university in its inter-college athletic prowess with its ranking in general ethical standards.

Reliable data should also be sought, he said, to show whether more men are excluded from teams since the colleges have demanded that their athletes measure up to certain standards in class work or be dropped from sport competitions.

"Knowledge of what a given grade will do to a student always influences the grade that an instructor decides upon," he said. "It would be worth knowing whether the grades of athletes given by instructors much interested in athletics average higher than those given by instructors obtuse to college enthusiasms. This is not a question of instructional ethics, but merely one of instructional psychology."

Statistics should be gathered, he continued, showing to what extent men trained on college teams keep up outdoor sports after graduation, as compared with men who engage in more individualistic sports in college days.

As a substitute for inter-college sport battles, the psychologist suggested that the plan of having teams from the same college compete should be given a fair and careful trial, to see whether group consciousness and college loyalty and enthusiasm cannot be built up by some different system.

"Abolition of inter-collegiate athletics would be an unmixed blessing," the professor stated, adding that "no university administration and faculty group has felt able to initiate any drastic surgical operations, knowing the opposition of the alumni and the spinelessness of the faculties generally."

Students flock to winning colleges in larger numbers and local alumni contribute more generously to them, he pointed out. But while a few husky students get too much physical development under the system, the majority who need it the most do not get it.

"Provision for tennis courts and golf links are in most institutions ridiculously small as compared with the total number of students. Of course, gymnasium work is prescribed, and military drill is elective or prescribed. But any one who supposes that these are substitutes for real sports I shan't bother to argue with."

The often heard argument that inter-college sports promote good feeling between colleges was hailed as "bunk" by the psychologist, who declared that in reality the students' one interest in the contests was to beat the opponent.

"The joy with which the mob in one institution welcomes the news that the rival team has been weakened by injury, death, or the rude action of an unappreciative faculty is merely one indication of the general attitude," he said.

Science News-Letter, June 2, 1928

Chemist Makes Synthetic Sugar

Chemistry

The synthesis of sugar by two Swiss chemists, Professor Ame Pictet and Hans Vogel, has aroused great interest among chemists. For this is a problem on which investigators have worked in vain for over fifty years because of its scientific interest and possible commercial importance. Sugar of the common sort, extracted from cane or beet, is easily split up, or, as it is called, "inverted," by weak acids, forming two other sugars. One of these is glucose, which is now manufactured in the United States from corn. The other half is fructose, which can be manufactured from Jerusalem artichoke as has recently been demonstrated here by the U. S. Bureau of Standards.

But to bring these two sugars together so as to form sugar of the common or table variety has hitherto been impossible. Professor Pictet has discovered that the difficulty has come from the fact that fructose exists in two forms identical in composition but differing in the arrangement of their atoms. By transforming the normal fructose over into what is called the "gamma" form he was able to combine this with an equal amount of glucose and get sucrose or common sugar. This he accomplished by first joining to each molecule of glucose and fructose four molecules of acetic acid, the acid of vinegar. After the two sugars have been combined the acid is easily eliminated by alkali.

Since this is a difficult and expensive process it could not be employed on a commercial scale, but it is important as proving that it is possible to make sugar artificially and it suggests the possibility of inventing new kinds of sugar which are not to be found in nature. Some of them might prove to be sweeter than common sugar or safer for the use of diabetics.

Professor Pictet of the University of Geneva is now seventy-one years old and has long been one of the world's leading authorities on the constitution of sugar and cellulose. Within the last two years he has succeeded in synthesizing two other of the double sugars, lactose which occurs in milk and maltose which occurs in malt.

Science News-Letter, June 2, 1928

Wild West Days in Siberia

Geography-History

BASSETT DIGBY, in *Tigers, Gold and Witch-Doctors* (Harcourt, Brace):

At Albazin a strong fort was established by a gang under the leadership of a Polish freebooter named Tchernigovski. He was a pious man who felt that the place ought to have a resident chaplain. Business was quite good enough to stand that slight addition to the overhead expenses. As prospective applicants for the post could not be obtained, an armed gang was sent westward, with instructions to kidnap a priest. It did.

The Chinese fur traders had their eye on Albazin, for all the best sables from the Amur forests were finding their way thither. They besieged it several times but managed to capture it only once after a sporting attempt to bluff them into relinquishing the attempt had been made by Tchernigovski. When the fort's food had almost disappeared and things looked desperate, he sent out to the Chinese leader, with his compliments, a sumptuous savoury dog pie. The pie weighed fifty pounds and needed three men to carry it. The inference, of course, was that a little old fifty-pound pie more or less made no difference whatsoever to *that* garrison. The commander of the besiegers took delivery of it with marked courtesy. The following day he sent back the dish and a flowery message of thanks. So highly appreciated, he declared, had been the pie that many of his officers and men had not been able to obtain even the smallest piece. It would be a source of rankling regret to them to the end of their days, if they could not summon up a memory of the unparalleled pie-making prowess of Mr. Tchernigovski's chef, and thus be in a position personally to bear testimony to his skill. In the circumstances, would not Mr. Tchernigovski favour them with *another* pie, rather larger than otherwise, to enable *every one* to taste a delicious morsel!

That called poor Tchernigovski's bluff—the very last little coterie of assorted mongrels in the precincts of the fort had gone into that fifty-pound pie. And he knew that if another good-sized pie was not handed over, the besiegers would know that his gang was at the end of its resources. He temporized by sending back a flowery message, conveying his keen gratification at the gastronomical zest with which his chef's *piéce de résistance* had been consumed and the pleasure that it would now give him to have another big pie prepared. But two or three days went by and no pie—big, small, or medium—appeared. Thus heartened, the Chinese besiegers stood their ground, and obtained the bloodless surrender of the fort, allowing the garrison to retain their arms and march off into the forest in return for giving up all the furs instead of burning them.

Science News-Letter, June 2, 1928

A fortress in Palestine which figured in Bible history has been excavated and many traces of Israelite life have been found, bearing out the descriptions given by Hebrew prophets.

The ancient Etruscans, who lived long before the Roman civilization, had many curious ideas about lightning, and their chief god had at his disposal three lightnings, other gods having only one.

The effect of the World War on the German population is shown in recent census figures: Children under 10 years made up 23 per cent. of the population in 1910, as compared with less than 16 per cent. in 1925.

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Mosquitoes—*Continued*

flowers during the critical period of malaria, from the beginning of summer to the end of autumn. He states that the highly scented blossoms are frequented by the malaria mosquitoes, which feed on the nectar. This nectar contains coumarin, a sugar syrup. The contention is that coumarin plays a role in the mosquitoes comparable to that which quinine plays in man, and that in the insects it stops the development of the malarial plasmodium which the mosquito, therefore, can not transmit to man.

Sir William states that the regions in Egypt where there is abundant cultivation of clover are immune from malaria, and is an enthusiastic supporter of Dr. d'Herelle's "clover-quinine" theory. American students of the malaria-mosquito problem are still slightly skeptical about it. However, like good Missourians, they are willing to be shown; and should the theory be conclusively proven it would give additional good reason for the cultivation of clover crops in malaria-ridden regions.

In addition to the plants that destroy or discourage mosquitoes while they are alive, there are others that do good service in the hands of the human mosquito-fighting forces after they are dead. Pyrethrum powder, one of the commonest of commercial insect powders, consists of the dried flowerheads of a white, daisy-like chrysanthemum; it is much used in clearing houses and other buildings of the winged pests.

A more recent addition to the vegetable weapons in our anti-mosquito armory is the tropical plant Derris, which comes from the Philippines. The dried roots of this plant are powdered and dissolved in water where the mosquito larvæ swarm. Three parts of the powder weight to a thousand of water proved effective in clearing out the hated wigglers. Derris may come to be a useful addition to the oils and arsenical chemicals now used in clearing up infested ponds, swamps and reservoirs.

The files in Dr. Howard's office contain curious bits of mosquito information from all over the world. Some of the oddest bits are about animal enemies of these insect pests. In addition to our valiant little ally Gambusia, which has now been carried from its home in America to such distant lands as Italy, India, and Samoa there are listed a number of other top-feeding minnows, as well as certain kinds (*Turn to next page*)

Million-Volt "Cosmic" Rays

Physics

Extreme high-frequency X-rays, generated in a million-volt tube, are the next item of promise on the program at the California Institute of Technology. Allied to the investigation of the cosmic rays, which has recently yielded such interesting results, is the attempt, long under way at the Institute, at the artificial production of very short waves, and, therefore, very penetrating radiation. In the hands of C. C. Lauritsen and R. D. Bennett this work has already yielded some promising results.

As yet no apparatus can be devised for handling the terrific electric potential required for the artificial production of cosmic rays. For intermediate rays of about one-twenty-billionth of an inch wave-lengths, however, there seem to be experimental possibilities. Such rays are much shorter than the surgeon's X-rays and much more difficult to produce.

The X-ray "tube" used in the new work is several yards long, made in sections similar to the glass cylinders used in gasoline dispensing apparatus. Before operation all but one-billionth part of its air content is pumped out. A water-cooled anode raised to a potential of a million volts pulls electrons bodily and violently out of the nearby cathode by the application of the principle of "field currents" studied intensively for some years past at the Bridge Laboratory by Millikan, Eyring, and Lauritsen. Under this terrific (*Turn to next page*)

Seventeen-Year "Locusts" Appear

Entomology

The seventeen-year cicada, often called the seventeen-year locust, is booked to appear during early June through a wide stretch of territory east of the Alleghenies, from North Carolina up to the Hudson valley and the Long Island Sound region. In a few spots in the middle west, in southern Indiana and southern Michigan, it is also expected to emerge.

These remarkable insects, which are the longest-lived of all the six-legged hordes that crawl the earth, spend over sixteen years under ground, clinging to plant roots from which they suck their nourishment. Then, in the spring of the seventeenth year, they emerge from their burrows, shed their pupa cases, and spend a few weeks as fully developed adults, mating and depositing eggs to provide for the next generation.

During the four or five weeks of their above-ground existence the seventeen-year cicadas make their presence known by the incessant shrill song of the males. The chorus of millions of tiny saw-like voices is very disagreeable to many persons. The Pilgrim Fathers didn't like it. Governor Bradford spoke of it as "a constante yelling noyes, as made all ye (*Turn to next page*)

Red Light Shines Through Fog

Physics

A brilliant red arc light that makes use of the rare atmospheric gas neon, and which can shine through thick fog, has been developed at the Research Laboratory of the General Electric Company. The new lamp is the result of the work of Dr. Clifton G. Found, in collaboration with J. D. Forney, of the Cooper-Hewitt Electric Company, and has just been demonstrated by them to engineers.

Airplane landing fields will probably be among the first to make use of the lamp, for by outlining the fields with them aviators flying above through fog will be enabled to make a safe landing. Such an occurrence as that of Commander Byrd on his flight to Paris, when he actually flew over Le Bourget, but could not see to land, would probably be prevented.

Docks in harbors may also be marked with the lamp. According to Dr. Found, the light has been tested for this use when one was recently placed on a pier in the Hudson River. "Observations from boats during fog," he says, "have shown that it was possible to pick up the red neon light before any of the other lights in the same vicinity were observed."

Earlier forms of neon tubes, which give the characteristic red neon light that is now so common in advertising signs, suffer (*Turn to next page*)

Man-Made Cosmic Rays—*Continued*

force the electrons attain a speed very near to 186,000 miles per second, the velocity of light. Striking the anode at this enormous speed the electrons generate X-rays much like the gamma rays naturally emitted by radium.

In preliminary trials now being run in the high tension laboratory of the Institute, where a million-volts to ground at a thousand kilowatts is available to the experimenters, Messrs. Lauritsen and Bennett have succeeded in obtaining continuous operation of their new tube at voltages that have approached the million mark. The high-frequency rays produced were observable through the steel doors of the laboratory more than 100 feet away.

The physicists of the Institute make no pretense of any immediate project beyond an extension of spectrographic studies, long a part of Dr. Millikan's program. It is suspected, however, that these new and very difficult experiments are a preliminary skirmish in a further campaign on the nucleus of the atom. It is well-known that the gamma rays of radium are intimately connected with nuclear disintegration and transmutation of elements. The structure of the nucleus, to be sure, is a profound mystery, but there is plausible evidence of enormous forces connected therewith. Electrically the problem is one where voltage is counted in seven and eight figures. Economically the problem suggests fabulous power values as yet wholly within the domain of fancy.

Science News-Letter, June 2, 1928

Seventeen-Year Locusts—*Continued*

woods ring of them and ready to deafe ye hearers."

The immense number of these rather large insects sometimes causes alarm, but they are really comparatively harmless. They feed very seldom or not at all, depending on the reserves accumulated during their long underground life. The principal mischief is caused when the females lay their eggs, which they deposit in furrows cut into the green bark of young twigs. This causes a temporary defoliation of many trees, but no permanent harm in the forests. It may be very damaging at times, however, in orchards and nurseries.

There are 17 "broods" of the seventeen-year cicada, distributed in various parts of the country. One brood comes out each year. The one emerging this year is designated as Brood II. Brood III, which is due in 1929, has its headquarters in the prairie states, especially Iowa. In addition to the seventeen-year species there is an allied thirteen-year form which ranges principally in the lower Mississippi region. This is divided into 13 broods, so that an outbreak of this insect also is to be expected somewhere in the South every year.

Science News-Letter, June 2, 1928

Red Neon Arc—*Continued*

from what is called the "cathode drop." This is the great difference in voltage between the electrode through which the electric current enters the tube, and the nearby gas. On account of it, also, tubes must be operated with a high voltage, and must be made quite long in order to be efficient. Another disagreeable effect is that the gas is made to gradually disappear.

The new tube of Dr. Found and Forney heats the cathode, or the electrode through which the current enters the tube, by means of an additional electric circuit. This causes it to give off the electrons which cause the neon gas to glow, but without the high voltages that are needed in the older tubes. By such means an extremely efficient source of brilliant red light can be obtained. Light of this color is best for penetrating fog.

Another possible use of the lamp is in photography, especially in colors. The mercury vapor lamp, which gives a characteristically violet colored light, has often been used for ordinary photography, but the unnatural pallor which it causes is a disadvantage, especially where colors are concerned. By combining the neon light with the mercury vapor lamp, the former supplies the red rays which are lacking in the latter, and the result, said Dr. Found, is a good approximation to white light.

Science News-Letter, June 2, 1928

Mosquitoes—*Continued*

of tadpoles and newts. Russia reports that one species of leech gobbles up mosquito larvæ most greedily. Many insects, including water bugs, beetles and certain kinds of flies, assist in the massacre. There are two or three genera of beneficial mosquitoes recorded, whose carnivorous larvæ make cannibal feasts out of the larvæ of other species of mosquitoes. Two new tropical forms of these have been reported within the past year. From Russia again comes the astonishing statement that mosquitoes have been seen feeding on lice and bedbugs, thus getting their ration of human blood at second hand, but incidentally also killing other insect foes of man!

Yet, in spite of all the help we get from our plant and animal allies, and of all our efforts on our own behalf with oil and arsenicals and other poisons, the war with the mosquito hosts is by no means near a victorious end. Years of battle with the buzzing, biting, disease-bearing pests are still ahead.

"I understand," says Dr. Howard gravely, "that before he lost his money, the great philanthropist, Andrew Gump, offered a reward of fifty million dollars for the last mosquito. In spite, however, of the wonderful anti-mosquito work that is going on, I have an idea that any one of us, however modest his financial condition, would be fairly safe in adding a hundred millions more to this apparently generous sum offered by Mr. Gump."

Science News-Letter, June 2, 1928

Howling monkeys have such extraordinary vocal abilities that many zoos refuse to keep them because they disturb the other animals.

The grocery bill for the London Zoo last year included seven tons of apples, two tons of grapes, 175,000 bananas and 32 tons of potatoes.

Bulgarian rose growers who sowed their fields with tobacco after the World War are returning to the production of rose oil for the perfume trade.

Although the number of apple trees in this country is declining, the output per tree is increasing sufficiently so that the apple crop is larger than ever.

About 95 per cent. of the whale oil used in this country goes into soap.

FIRST GLANCES AT NEW BOOKS

COLUMBUS—Marius André. Tr. by Elöise Parkhurst Huguenin—*Knopf*. Here is a Columbus after a modern pattern of biography, in which the pedestal of a hero is contemptuously kicked away and mud is slung plentifully at the shattered remains. It is a Columbus with a rare poetic imagination, but a Columbus who lets that imagination run riot to fantasies which he reports as sober facts; an ignorant Columbus who clings to antiquated notions of geography and cannot even use a navigator's instruments to locate on a map the lands he discovers. Following the contradictory records and legends of Columbus' career, the biographer enjoys dark suspicions at practically every turn and cheerfully believes, and sets down as fact, the worst explanations that can be thought of. One achievement is chalked up to the credit of the admiral of the ocean sea: he "discovered man in a state of nature. That is Columbus' own and great discovery."

Biography

Science News-Letter, June 2, 1928

THE RÔLE OF SCIENTIFIC SOCIETIES IN THE SEVENTEENTH CENTURY Martha Ornstein—*Univ. of Chicago* ($3). With great and fundamental scientific discoveries that came with the seventeenth century, it can justly be called one of the greatest of centuries. In this posthumous work, Mrs. Broffenbrenner (née Ornstein) tells not only of the founding of the Accademia del Cimento in Florence, first organized scientific academy, the Accademia dei Lincei in Rome, the Royal Society in London, the Académie des Sciences in Paris, and various others, not so well known, in Germany. She also takes up the rôle of the individual scientist, scientific journals and science in the universities of the period. Complete index and bibliography materially enhance the book's usefulness.

General Science

Science News-Letter, June 2, 1928

GARDEN CINDERELLAS—Helen M. Fox—*Macmillan* ($5). A well-gotten-up treatise on the cultivation and care of lilies, with a good deal of useful information on their botany and history, well illustrated. It will be especially useful to the home flower grower, and must also be given a place on the reference shelves of the commercial grower and the botanical classroom.

Botany

Science News-Letter, June 2, 1928

THE MODERN CAT—Georgina Stickland Gates—*Macmillan* ($2). For those who like cats, Dr. Gates' book, devoted to the mind and manners of the cat, will be of especial interest. Here are many enlightening ideas and reports of experiments showing how puss uses her eyes and ears, and how her IQ ranks with that of other animals. Aside from its entertaining readable quality, the book is written as an introduction to comparative psychology, and so comprehensive a survey of what is known about the psychology of one animal should give the student a good basis for studying the animal mind.

Animal Psychology

Science News-Letter, June 2, 1928

HOW WE INHERIT—Edgar Altenberg—*Holt* ($3). A closely written and coherent presentation of the main facts of genetics.

Heredity

Science News-Letter, June 2, 1928

THE GEOGRAPHY OF THE POLAR REGIONS — Otto Nordenskjöld and Ludwig Mecking—*American Geographical Society*. A book of timely interest and permanent value, a rare combination. Just what is needed as background to the understanding of the recent flights of Byrd, Wilkins and Amundsen over the North Pole and the prospective flight of Byrd over the South Pole. A thorough and authoritative description of the Arctic and Antarctic regions, past and present, by Professor Nordenskjöld of the University of Gothenburg and Professor Mecking of the University of Münster.

Geography

Science News-Letter, June 2, 1928

THE STAR PEOPLE—Gaylord Johnson—*Macmillan* ($1.50). A reissue of a very useful book for teaching astronomy to young children.

Astronomy

Science News-Letter, June 2, 1928

PRINCIPLES OF ABNORMAL PSYCHOLOGY — Edmund S. Conklin—*Holt*. The problem of what to put first is an important one in introducing students to abnormal psychology, and this point has been given special consideration by the author, in arrangement of material. Psychoses and neuroses take up a comparatively small proportion of the book, so that there is room for chapters on shell shock, spiritistic phenomena, abnormalities of sleep and other topics often crowded out of texts dealing more closely with mental disease.

Psychology

Science News-Letter, June 2, 1928

NATURE RAMBLINGS

By FRANK THONE

Natural History

Cats

No one who keeps a cat, or whose neighbors keep cats, has any right to put up a bird house or do anything else that will attract feathered visitors. For that merely provides Puss with fresh meat to be had for easier-than-usual hunting.

It is idle to assert, "But *my* cat would never kill a bird. Why, she won't even look at one!" Perhaps she won't—while you are watching. But at night, or when you are away from the house for an hour—

The point is, cats are not really tame animals. Their zoological name, *Felis domestica*, is really a misnomer, for they have never been domesticated as dogs have been domesticated. They merely consent to accept quarters in one's house and food from one's pantry, but they yield none of their ancient rights to go where they please and to kill and eat what they will. If they restrain themselves at all it is because they know they are being watched, and will be interrupted and perhaps punished if they pounce on a bird. Once the supervision has been removed they let their own natures have sway.

At the present time, when many fledglings are learning to fly, and hence must spend some hours half-helpless on the ground, it is especially bad to have cats around. The young birds have neither their parents' powers of flight nor their experience at detecting enemies, and so fall more easily into the claws of cats.

This is no indictment of cats as such. Cats are cats, and their nature is cat-nature, that is to say, the nature of beasts of prey. They have been used to getting their living by claws and teeth for many thousands of years. and a few centuries of semi-civilization have not changed them. They may be expected to react toward edible birds in only one way. Therefore, if you would keep cats and also keep birds, you must be sure to keep the two separately.

A Statement of Purpose

(The aims, ideals and aspirations of an institution)

SCIENCE SERVICE is a unique institution, established at Washington for the purpose of disseminating scientific information to the public. It aims to act as a sort of liaison agency between scientific circles and the world at large. It interprets original research and reports the meetings of learned societies in a way to enlighten the layman. The specialist is likewise a layman in every science except his own and he, too, needs to have new things explained to him in non-technical language. Scientific progress is so rapid and revolutionary nowadays that no one can keep up with it from what he learned at school. Science Service endeavors to provide life-continuation courses in all the sciences for newspaper readers anywhere in America without tuition fees or entrance examinations.

In a democracy like ours it is particularly important that the people as a whole should so far as possible understand the aims and achievements of modern science, not only because of the value of such knowledge to themselves but because research directly or indirectly depends upon popular appreciation of its methods. In fact the success of democratic institutions, as well as the prosperity of the individual, may be said to depend upon the ability of people to distinguish between science and fakes, between the genuine expert and the pretender.

Science Service spares no pains or expense in the endeavor (1) to get the best possible quality of popular science writing and (2) to get it to the largest possible number of readers. If in doing this it can make both ends meet, so much the better. If not, it will do it anyway.

Through the generosity of E. W. Scripps, Science Service has been assured of such financial support as to insure its independence and permanence. Mr. Scripps's long and wide experience as a newspaper editor and proprietor had convinced him of the importance of scientific research as the foundation of the prosperity of the nation and as guide to sound thinking and living and he realized the need for an independent agency that would bring the results of research to the attention of the entire people so these could be applied to the solution of their personal, social or political problems.

Science Service is chartered as a non-profit-making institution and all receipts from articles, books, lectures and films are devoted to opening up new avenues for the diffusion of knowledge and developing promising methods of popular education. Although Science Service has a philanthropic purpose, it is conducted on business principles, with the aim of making each branch of its activities ultimately self-supporting so far as possible. All acceptable contributions are paid for and all published articles are charged for.

Science Service is under the control of a Board of Trustees composed of ten scientists and five journalists. The leading national organizations of all the sciences, the National Academy of Sciences, the National Research Council, and the American Association for the Advancement of Science, appoint three trustees each.

Science Service occupies offices in the magnificent new building of the National Academy of Sciences and the National Research Council on Potomac Park opposite the Lincoln Memorial.

This strategic situation enables the Service to keep constantly in touch with the progress of the sciences because new inventions and discoveries are promptly put on exhibition in the building, and the Council brings together investigators in the various sciences and leaders in engineering and industry from all parts of the country.

Science Service is not a governmental institution, but it is in close contact with the numerous governmental bureaus of research. It is not under the control of any clique, class or commercial interest. It is not the organ of any single scientific association. It serves all the sciences. It engages in no propaganda, unless it be called propaganda to urge the value of research and the usefulness of science.

Science Service began its work on January 1, 1921, and has now a sizable office staff with a large corps of contributors in the chief research institutions of this country and Europe.